CHAPTER 11

PLANNING FOR CONSTRUCTION

Section I. Construction Requirements

11-1. <u>Factors to be Considered.</u> The selection of a site for and the arrangement of the lock and dam structures require consideration of problems likely to occur during construction. The effects of the cofferdam on flood stages, the need for passing traffic (if the stream is presently a navigable waterway), and the amount of protection and maintenance required are important factors that could affect the cost of the project. During the construction of nonnavigable type dams, it will be necessary to construct at least one lock before the river is blocked to open-river navigation to maintain navigation during construction. Conditions in the lock approaches with the final-stage cofferdam under construction will be different from those with the cofferdam completed and in place.

11-2. <u>Maintenance of Traffic.</u> Where traffic is to be maintained during construction of the final cofferdam phase, the upper lock gate sill and upper lock approach channel should be low enough to pass traffic during the low flows. Where a guard wall with ports is provided, some arrangement should be made for at least partial closure of the ports to prevent tows from becoming pinned against the wall and to protect small boats when the water level is below the ultimate normal pool elevation. The closures usually consist of curtains constructed of metal, concrete, or other suitable material extending from the top of the ports down, but not necessarily to the bottom of the ports. During partial closure of the ports, the tendency for bed scouring at the bottom of the ports will be increased. Closure of the ports by curtains will increase the tendency for crosscurrents near the end of the guard wall and could affect tows entering or leaving the lock, particularly during the higher flows when open-river conditions prevail. When the final-stage cofferdam is adjacent to the lock, flow from the completed portion of the dam could cause currents to be directed toward the lower guard wall, producing scour along the wall and strong eddy currents in the lower lock approach. Conditions for navigation through the lock would be better, and in most cases, there would be less danger of affecting the stability of the structure with the last cofferdam stage on the opposite side of the channel.

Section II. Cofferdam Design

11-3. <u>Effects on River Currents.</u> Cofferdams obstructing partial riverflow will tend to cause scour, particularly near the upstream corner on the river side. The depth of scour, which could be appreciable, depends on the amount of flow affected by the cofferdam, shape of the cofferdam, and the erodibility of the channel bed. Cofferdams having square corners on their upstream side would tend to scour deeper than those with rounded corners or those with upper arms angled less than 90 degrees to the direction of flow.

11-4. Cofferdam Configuration. The scour along the riverward face of the cofferdam can be minimized by the use of a deflector. Rounded corners or deflectors designed to streamline flow will tend to reduce the depth of maximum scour but would maintain high velocities along the riverward face of the cofferdam. Deflectors can be designed to reduce or eliminate the high velocities along the main part of the cofferdam. Deflectors consisting of an upstream extension of the riverward arm of the cofferdam with a section angled about 45 degrees landward have been successful in containing the scour near the corner of the deflector and along the deflector itself, away from the main part of the cofferdam under pressure when dewatered (fig. 11-1). The length of the extension and the angled portion of the deflector would be based on the amount of contraction provided by the cofferdam and velocities of riverflow. The use of 150- to 200-foot upstream extensions with deflector arms at least that length has produced satisfactory results in tests of Mississippi and Ohio Rivers projects when the river channel was contracted as much as 50 percent. This type of deflector caused deposition along the riverward face of the cofferdam and moved downbound tows away from the cofferdam (fig. 11-2). The downstream arm of the cofferdam, extending normal to or at an angle of not more than about 45 degrees in relation to the direction of flow, would generally be subjected to little or no scour since sediment moved along the riverward arm would tend to be deposited downstream of the cofferdam.

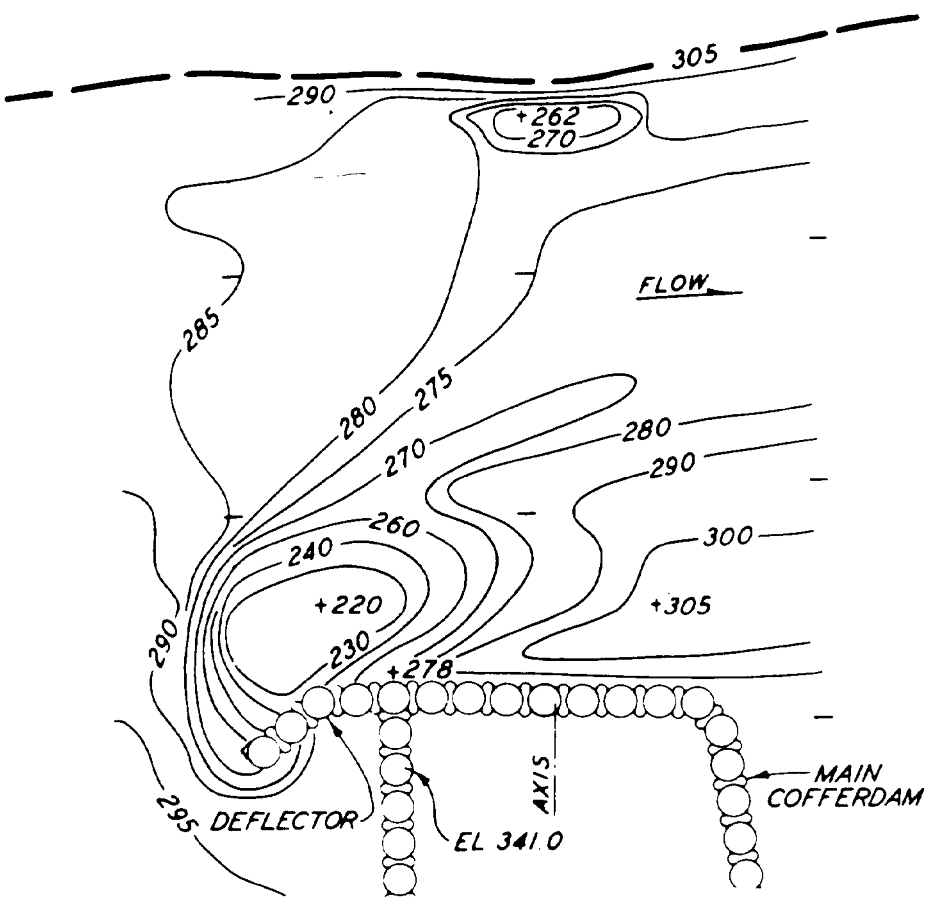

Figure 11-1. Typical scour pattern with deflector

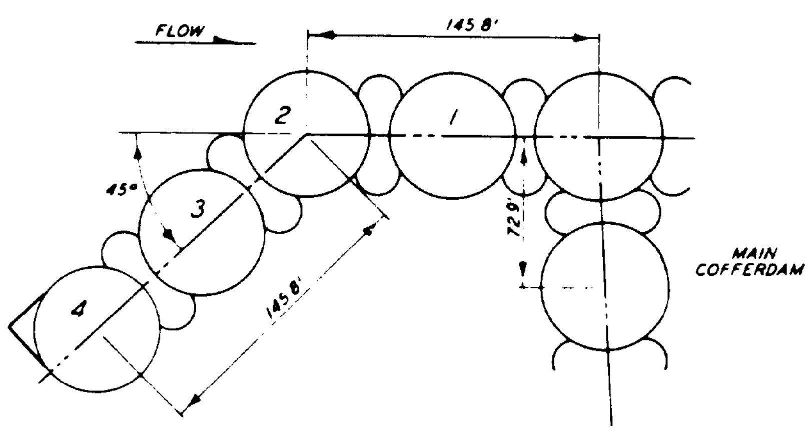

Figure 11-2. Cofferdam deflector